

Final

Site Specific Final Report
Bains Gap Road MEC Removal Action
Fort McClellan, Alabama

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Task Order 0004



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Compact Disk

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ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
CD	Compact Disc
CL	Code Letters
CLPS	Constellation Laser Positioning System
EM	Electro Magnetic
Ft	feet
FWS	U.S. Fish and Wildlife Service
GPO	Geophysical Proveout
IAW	in accordance with
JPA	Joint Powers Authority
Kg	Kilogram
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MLNWR	Mountain Longleaf National Wildlife Refuge
MIL STD	Military Standard
mm	millimeter
mV	milivolt
NAD	North American Datum
PWS	Performance Work Statement
QA	Quality Assurance
QC	Quality Control
RTS	Robotic Total Station
SUXOS	Senior Unexploded Ordnance Supervisor
TDEM	Time Domain Electromagnetic
TF	Transition Force
TtEC	Tetra Tech EC, Inc.
USAESCH	U. S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQC	Unexploded Ordnance Quality Control Specialist
VL	Verification Level

1.0 INTRODUCTION

1.0.1 This document will discuss the objectives, procedures and results of the Munitions and Explosives of Concern (MEC) Removal Action performed on the area known as the Bains Gap Road Area located within the Mountain Longleaf National Wildlife Refuge (MLNWR) by Tetra Tech EC, Inc. (TtEC) at Fort McClellan, Alabama between January 2006 and April 2006. During this period, the objective of conducting an MEC Removal was successfully accomplished. This particular area encompasses a portion of Bains Gap Road and certain areas along each side of this road. This is the portion of the road that passes through areas within the MLNWR that are considered to have possible contamination from MEC. The specific area cleared can be seen on Figure 4.1. The removal action consisted of location surveys to delineate the boundary of the area to be cleared and grid setout to locate the corners of all grids within the removal area. It also included; brush clearing, surface clearance, geophysical survey (using digital geophysics), intrusive activities, quality control, and government quality assurance. All of these phases will be discussed in the following sections. This document will discuss the unique operational procedures and the results for the removal action that took place as part of this task order.

1.1 OBJECTIVE AND SCOPE

1.1.1 The objective of this task order was to perform a Clearance to Depth on and along Bains Gap Road in the area, referred to in this report as, the Bains Gap Road Area at Fort McClellan, Alabama. This particular area was cleared during a previous removal action known as the FWS Area Roads, Firebreaks, and High Use Areas by TtEC. During the previous clearance, anomalies located under the pavement of the road were not dug and the width of the previous clearance was 20 feet from centerline. The local community has requested that the Fish and Wildlife Service (FWS), the Army, and the Joint Powers Authority (JPA) reopen Bains Gap Road to public use. The FWS had a road survey completed and have worked with the JPA, the Army and Calhoun County to improve Bains Gap Road to meet federal standards in order to open the road to the public. In order to open the road for public use the road will require some major work to be done to add guard rails, repave and widen the road, and improve drainage along the road. Once the plan was decided upon it was determined that the initial clearance did not clear a wide enough passage and that leaving anomalies under the road was not acceptable. The U.S. Army Engineering and Support Center, Huntsville (USAESCH) contracted with TtEC to clear this area (Figure 4.1).

1.1.2 The Performance Work Statement (PWS) associated with this Task Order included:

- Quality Control
- Work Plan
- Geophysical Proveout

- Removal Action

The PWS is provided on the compact disc (CD) that accompanied this report.

1.2 SUBMITTALS, APPROVALS, AND AUTHORIZATION

1.2.1 In August 2005 the USAESCH solicited bids for this removal action and in September 2005 the USACE awarded the work to TtEC. The Draft Work Plan was submitted to the USAESCH in November 2005. In December 2005, TtEC received permission from the USAESCH to begin non intrusive field work. The Final Work Plan was submitted to the USAESCH in December 2005 and in January 2006 TtEC received a notice to proceed from the USAESCH with all field work. The work plans were reviewed and comments received from the USAESCH, the Ft. McClellan TF, and Alabama Department of Environmental Management (ADEM). ADEM provided approval of the Final Work Plan on January 20, 2005. The Final Work Plan can be seen on the CD that accompanied this report and the letters to proceed are located in Appendix A.

1.3 SITE LOCATION

1.3.1 Bains Gap Road is located on the former Ft. McClellan and runs primarily east and west. It extends from the main cantonment area through the MLNWR and off the former post. The area where this removal covers is located entirely within the MLNWR and can be seen on Figure 4.1.

2.0 DISCUSSION

2.0.1 In the following sections we will discuss the technical aspects of the work performed, covering the procedures and equipment that were used and we will discuss the results of that work.

2.1 SITE PREPARATION ACTIVITIES

2.1.1 Location Surveys

2.1.1.1 Boundary Setout. Boundary Setout was conducted by a sub-contract Registered Professional Land Surveyor (Skipper Engineering Inc., Rainbow City, Alabama, License Number 20141). All work was carried out in accordance with the requirements of the "Minimum Technical Standards for the Practice of Land Surveying in the State of Alabama". The boundary of the areas to be cleared was set out as detailed in the figures in the PWS. All coordinates were based on the State Plane Grid System to the North American Datum of 1983 (NAD83). TtEC Unexploded Ordnance (UXO) Technicians provided anomaly avoidance for the survey crew in order to ensure that each survey location was clear of sub-surface anomalies before the stake was driven into the ground.

2.1.1.2 Grid Setout. The areas to be cleared were relatively small in area and all geophysical mapping was done using either the Robotic Total Station (RTS) or the Constellation Laser Positioning System (CLPS). Skipper Engineering installed all the grid corners in the same manner that was used to install the boundary survey. The grid layout can be seen on Figure 4.2.

2.1.2 Surface Clearance

2.1.2.1 Surface Clearance was performed by TtEC using a 5 man surface clearance team. The team used Schondstedt hand held locators to assist in the surface clearance operation. Each grid was swept by the team walking lanes to ensure no area was missed. During the surface sweep task 0 MEC items, 1 pound of MD, and 54 pounds of Non-MD Scrap were recovered.

2.1.3 Brush Clearance

2.1.3.1 Brush clearing was carried out by Envirogrind, LLC. Envirogrind used a mix of manual laborers using hand and power tools as well as using mechanical equipment designed for heavy brush clearing. The heavy equipment used was a commercial excavator fitted with a Fecon brand forestry mower and a Franklin 360 with a Fecon forestry mower. Both pieces of equipment worked well and with the ground crews the brush clearing was completed to a level that allowed for geophysical mapping to proceed.

2.2 GEOPHYSICAL MAPPING

2.2.1 A Geophysical Proveout (GPO) was performed prior to conducting the geophysical survey. A GPO work plan and GPO report were written and approved by the USAESCH prior to beginning actual field work. The GPO work plan and report are located in Appendix B-2e.

2.2.2 TtEC self performed the geophysical mapping of the Bains Gap Road area. All data acquisition, data processing and interpretation, was managed by a qualified geophysicist. There were a few small areas that were not geophysically mapped due to the characteristics of the terrain that precluded safely carrying the EM-61 coil. These characteristics were steep and rocky slopes. These areas were cleared using a mag and dig protocol utilizing a handheld Vallon VMX2. Each area that was cleared with the Vallon is shown on the geophysical maps which are located in Appendix D-2. Geophysical data was collected utilizing a Time Domain Electromagnetic (TDEM) method. The EM-61 is manufactured by Geonics LTD. The EM-61 system was used in conjunction with the CLPS or RTS for positional data within the area. The RTS positioning system was used in open areas while the CLPS was used in the more tree covered grids.

2.2.3 One TtEC team trained in geophysical mapping carried out the geophysical mapping operation within the area.

2.2.4 The geophysical data and positional data, from both the RTS and CLPS, were collected. The on-site geophysicist did the initial processing and sent the data to our Denver office where the data was interpreted and anomalies selected.

2.2.5 All data was processed and analyzed in accordance with (IAW) the general processing/analysis sequence portrayed in the Work Plan. Target selection criteria were based on the smallest MEC objective of the site, which was the 37mm projectile. The selection of a target was based on the relationships between the signal intensities of Channel 1 and 2, data acquisition path geometry, surrounding background characteristics, and the area shape of the potential target.

2.2.6 Each of the items intrusively investigated in the survey grids were compared against the geophysical anomaly characteristics to ensure that the item(s) removed from the excavation was consistent with the geophysical anomaly characteristics, as well as the geophysical classification (i.e., “dig” or “no dig”). The primary tool used to derive qualitative and quantitative relationships between items of different sizes and shapes and the geophysical anomaly characteristics is the data from the GPO. Additional information that can also be useful in the assessment is comparison of intrusive results and geophysical anomaly characteristics from other task orders and site-specific GPO’s.

2.2.7 While it is not possible in all cases to exactly quantify the interpretation criteria due to the complex interrelationships between the data characteristics of:

- Signal intensity

- Acquisition path geometry
- Anomaly shape
- Influence of surrounding anomalies
- Influence of the site characteristics (topography, vegetation, cultural features)

The following general guidelines were implemented during the interpretation process to select targets for excavation:

- Channel 2_366 time gate signal intensity > 3 mV above the local background
- Anomaly apparent on minimum of two adjacent data acquisition transects
- Ratio between minor and major axes of anomaly from ~ 0.5-1.5; edges of anomaly are definitive.
- Minimum interference from adjacent anomalies. Where interference from other anomalies is present (e.g., debris area), Channel 2 signal intensity decreased.

2.2.8 Processed EM61 data was generated on individual (by grid) color-coded maps exhibiting the signal intensity and locations of anomalies selected for reacquisition. These anomaly maps are included in Appendix D-2.

2.3 ANOMALY REACQUISITION

2.3.1 A two-man TtEC team using the CLPS or RTS performed anomaly reacquisition. The procedure for reacquiring the location of the anomalies was to obtain the State Plane coordinates of the anomalies in question from the geophysically interpreted dig sheets and place yellow flags in the ground at the designated locations. The yellow surveyor's flags had the grid and anomaly number marked on them with indelible pen.

2.4 OE INTRUSIVE OPERATIONS

2.4.1 The objective of the intrusive operations was to investigate and remove all MEC items. The geophysical mapping indicated the location of the target anomaly, although it was not possible to ascertain whether there were individual or multiple targets in many cases. Removal of all metallic items in a radius around each flagged anomaly was necessary as a small shallow target produces a similar handheld instrument response to a deeper, larger target. In some cases, the anomaly location contained several metallic items at varying depths and due to technological limitations, it was not possible to ascertain with any certainty, whether the first target excavated was the item of interest. The only way to assure that the target anomaly location was fully investigated was to clear the radius of all metallic anomalies. Intrusive operations were carried out using TtEC UXO Technicians. The team used both Schondstedt and Vallon hand held instruments to locate anomalies, however, only the Vallon was used as a final check to

ensure the hole was cleared. A total of 2689 anomalies were chosen as digs by the geophysicist. Of the 2689 anomalies investigated 1 was MEC, 106 were Munitions Debris (MD), 2295 were Non MD, and 44 were USAESCH placed seed items, the remaining 243 items were no finds. The seed items will be discussed in detail in section 3.

The following paragraphs explain the intrusive excavation process followed.

2.4.2 The Senior UXO Supervisor (SUXOS) planned the work location of the intrusive team taking into account availability of dig sheets, equipment availability and the required team separation distances. After the morning safety brief each day, the SUXOS allocated individual grids and documentation to the intrusive team leader for their days work.

2.4.3 After they had received their briefings and conducted their daily vehicle and equipment checks in the compound, the intrusive team mobilized to the work-site and commenced preparation of their equipment. Concurrent to this preparation, personnel allocated by the SUXOS conducted an area search within the work area and around it to ensure that unauthorized personnel were not present within the exclusion zones. After the check was conducted and blue locks placed on all gates, the SUXOS proceeded to give the intrusive teams authorization to commence intrusive operations for the day.

2.4.4 Within each grid, the intrusive team leader allocated anomaly flags for members of the team to excavate. The instruments used by the team were the Vallon VMX2 and Schondstedt handheld detectors. The team leader was responsible for ensuring that each excavation hole was cleared of metallic anomalies utilizing the Vallon.

2.4.5 As each anomaly was excavated, the team leader recorded the items found at each anomaly flag. A geophysical map and hardcopy dig sheet were continuously reviewed to ensure that the correct number of anomalies was excavated. In the instance where an anomaly flag had been displaced or was missing, the SUXOS was contacted and an anomaly reacquisition team was scheduled to replace the anomaly flag.

2.4.6 Items excavated from the anomaly locations could be described as MEC, UXO, MD, or Non MD. MEC distinguishes specific categories of military munitions that may pose unique explosives safety risks which means: (A) Unexploded ordnance (UXO), as defined in 10 U.S.C. 101(e)(5); (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard. UXO is defined as Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5)(A) through (C))) Any scrap item that is munitions related that does not contain energetic material is defined as MD, while scrap that is not munitions related is defined as Non MD. One MEC item was found during this removal action, a fired, but unfuzed, 75mm Shrapnel Projectile that still had the pusher plate in

place. The fuze had either functioned as designed or had been separated at impact when the round was initially fired.

2.4.7 In the instance where nothing was found at the anomaly location, the anomaly was annotated as a No Find. Instances where this occurred were investigated to confirm this categorization and the item was reacquired and re-dug if it was deemed necessary. Reasons for the No Find were attributed to several factors including the anomaly being removed during the excavation of adjacent targets, data aberrations due to geological conditions and data aberrations due to the coil hitting the ground or trees during data collection in steep and challenging terrain. All no finds were investigated by the Unexploded Ordnance Quality Control Specialist (UXOQC) to ensure that the location was clear of a metallic item. There were a total of 243 no finds.

2.4.8 Table 2-1 summarizes the results of the investigation.

**Table 2-1
Results of Geophysically Surveyed Intrusive Investigation**

Items Recovered	Number of Items	Percentage of Total Items
MEC	1	0.1%
MD	106	3.9 %
Non MD	2295	85.2%
No Finds	243	9.0%
USACE SEED	44	1.8%

2.4.9 Every intrusively investigated anomaly had many characteristics which were important to track for this report. These included such things as: what exactly the item was; if MD, the type of munitions the item was related to; depth, and so on. Below is a list of the types of items found during this removal action.

MEC: (1) Projectile, Shrapnel, 75mm was recovered;

MD: The following types of items were discovered throughout the area and were free of energetic materials;

- Projectile, 37mm, AP-T
- Projectile, Shrapnel, 75mm (fired and empty)
- Fuze, M1907, functioned
- Rocket, 2.36", Miscellaneous parts and pieces

Non MD: A great deal of Non MD Scrap was discovered within the area which consisted of:

- Rebar
- Small Arms Brass
- Wire and Nails
- Miscellaneous metallic trash

A complete list of each anomaly investigated is supplied in Appendix C-1.

2.4.10 The one MEC item was destroyed by detonation in the location it was discovered. The MD that was located was turned over to the USAESCH for use as seed items on future jobs, the 44 seed items that were placed as part of the QA process were returned to USAESCH as well. All non MD scrap was disposed of locally.

2.5 WORK PLAN DEVIATIONS

2.5.1 One work plan deviation occurred during the performance of this field work. This deviation occurred when the field teams began investigating the anomalies that were located under Bains Gap Road. Several of these holes were large, being over 3 feet in diameter. Since the work plan called for these holes to be back filled with engineered fill and to be packed and tested, the plan was to leave these holes open until the end and then fill with the engineered fill, pack, and test. The onsite USACE Safety Specialist felt that leaving the holes unfilled was a safety concern because if a person on bike or car were to try and traverse Bains Gap Road they could be injured if they fell in one of these holes. It was determined that the original material would be put back in the hole after the hole was cleared by the team leader and the UXOQC and would be re-dug at a later time and then re-filled with the engineered fill, packed and tested per the work plan. The holes were then back filled with the original fill and were later re-dug, filled, and tested IAW the approved work plan.

3.0 TESTS

3.1 QUALITY CONTROL (QC)/QUALITY ASSURANCE (QA)

3.1.1 Quality Control tasks were carried out by TtEC, while Quality Assurance tasks were carried out by USAESCH. The entire project demonstrated a high standard using the sampling protocols contained within Military Standard (MIL STD) 1916, DoD Test Method Standard, DoD Preferred Methods for Acceptance of Product (approved for use by all Departments and Agencies of the DoD).

3.1.2 *Quality Control.* The QC function on this entire removal action included the three phases of QC inspection (Preparatory, Initial, and Follow-up), also known as Process QC. The acceptance sampling, or Product QC, was performed using MIL STD 1916. A detailed description of the QC process follows below.

3.1.3 *Quality Assurance.* The QA function consisted of planned and systematic actions designed to verify that the quality met requirements in the plan. QA is an independent function designed to assess and report on whether the project quality function, as well as the project itself, achieve quality and project objectives. The governments QA process was used to ensure our entire process worked and to allow successful turnover of the area. The method of QA the USAESCH used included checks of our processes, verifying that the TtEC QC approach was being followed, verification of geophysical data, and planting seed items to assess TtECs total program. A detailed description of the QA approach follows below.

3.2 QUALITY CONTROL.

3.2.0 Project QC was split into two areas; process quality control and product quality control, or acceptance sampling.

3.2.1 Process Quality Control

3.2.1.0 Process QC is concerned with improving the efficiency and effectiveness of the processes. This can be considered a prevention approach to QC because it aims to detect problems early and improve processes before the final product is produced. The Process QC consisted of Preparatory, Initial, and Follow-Up Inspections on teams conducting key processes and specific process checks for different field processes through out the life of the project. A detailed description of the individual steps used in the QC process is presented below.

3.2.1.1 Preparatory Phase Inspections

3.2.1.1.1 Preparatory Phase Inspections were performed before starting each key process identified in the Quality Planning Phase. The purpose of these inspections was to review applicable specifications and verify that the necessary resources, conditions, and controls were in place and compliant before the start of work activities. The specific QC

checklist items assessed during the Preparatory Phase, and the results of those activities were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.1.2 Initial Phase Inspections

3.2.1.2.1 Initial Phase Inspections were performed the first time a type of work was performed under key processes. The inspections were conducted to check preliminary work for compliance with procedures and contract specifications. Other objectives include establishing and agreeing to the acceptable level of workmanship, checking safety compliance, reviewing the Preparatory Phase Inspection, checking for omissions, and resolving differences of interpretation. The Initial Phase Inspections conducted were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.1.3 Follow-Up Phase Inspections

3.2.1.3.1 Follow-Up Phase Inspections were performed on a scheduled and unscheduled basis. The purpose of these inspections was to ensure a continuous level of compliance and workmanship based on the quality levels established during the Preparatory and Initial Phase Inspections. The UXOQC and his designees were responsible for on-site monitoring of practices and operations taking place and for verification of continued compliance with the specifications and requirements. Details of the Follow-Up Phase Inspections were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.1.4 Hand-Held Instrument Tests

3.2.1.4.1 During the course of the Removal Action, the team was responsible for conducting daily hand-held instrument tests on the test grid before mobilizing to their daily work location. This daily check was conducted in the test area located outside building 215 to ensure that each handheld instrument was working properly and to ensure the operator knew which setting the instrument needed to be set to in order to properly use the instrument. These checks were documented on a daily equipment test form which can be seen in Appendix B-1.

3.2.1.5 Geophysical Field QC Procedures

3.2.1.5.1 The geophysicist used a series of QC steps in the daily process of collecting, processing and interpreting the data. An explanation of these steps is provided below.

1. Synchronize computer and data logger clocks +/- 1 s (time shift correction);
2. Static test for minimum of 30 seconds prior to and at the end of each data acquisition session (repeatability);
3. A Static response test at first and last grid of day (each test is performed for 3 minutes) (repeatability);
4. Daily shake tests were performed;

5. Rebar or Schonstedt walk 3 times, straight lines (side-middle-side) at start and end of every data acquisition session (drift and shift corrections);
6. Walk diagonal across grid at end of survey OR repeat first acquisition line, whichever is more time effective (repeatability); and
7. Use intelligible and repeatable file naming convention (date, team, grid, easily differentiate multiple files within same grid).

3.2.1.5.2 The geophysical processing QC procedures included:

- Turn Oasis log file on and save as same name as *.xyz file for each sampling grid.(data tracking);
- Use Oasis master database to keep track of processed individual *.xyz files, and window this database to generate *.xyz file for each sampling grid. Each sampling grid was placed in a separate folder with all interpreted files in this folder (i.e., run scripts from this folder). This data was made available over the network for each sampling grid. For master database, GDB header can be edited and changed for each *.xyz file to track progress of the survey, as well as to generate a master map of % complete. (data tracking); and
- All data (*.txt, * g61, *.xyz, *.dat, and excavation results when available) was delivered to the client representative on a weekly basis via CD.

3.2.1.5.3 Excavation results were reviewed for all of the grids to ensure the recovered item was representative of the original selected anomaly. After reviewing the intrusive data the project Geophysicist requested that 73 anomalies be reinvestigated because he felt the item reported was suspect based on the geophysical data. Of the 73 anomalies that the geophysicist requested reinvestigation on, none were MEC, nor were any of the items within the parameters to be considered a failure criteria item. A complete list of the anomalies that were requested to be reinvestigated and the results of the reinvestigation are provided in Appendix B-2h.

3.2.1.6 Internal and External Process Quality Check for Geophysical Interpretation

3.2.1.6.1 Quality checks of the Geophysical Interpretation Process were conducted by senior TtEC geophysicists and also separately by USAESCH. This included a review of the daily static and static response tests. These tests were performed prior to each data collection session. The results of these tests are posted on the geophysical maps in Appendix D and the digital results were submitted to USAESCH for their review.

3.2.2 Product Quality Control –Acceptance Sampling

3.2.2.1 Product QC is concerned with conducting an Acceptance Inspection on the final product after all the change or value-added processes have been completed, and it is otherwise ready for delivery. It should be noted that extensive Process QC procedures are required to ensure that the quality of the product sampled is high enough to consistently pass the sampling. Formal Acceptance Sampling was carried out on

completed grids in accordance with the sampling protocols contained within MIL STD 1916, DoD Test Method Standard, DoD Preferred Methods for Acceptance of Product (approved for use by all Departments and Agencies of the Department of Defense). Details of the MIL STD 1916 Acceptance Sampling are presented in the following sections.

3.2.2.2 A Sampling Plan is a procedure for selecting samples from a lot or population of material to be sampled and for using the results of that sampling to make an “accept” or a “reject” decision. On this project, the work area was broken up into 100-foot-by-100-foot grids, each containing 50 survey lanes corresponding to the area covered by a single pass of the EM61 at 2 feet by 100 feet. Each lane is a unit of production, and a number of these make up a lot. The MIL STD has two tables that are used to define the Sampling Plan. Table 3-1 (Table 1 in the standard) guides lot size selection; Table 3-2 (Table 2 in the standard) guides the sample size selection. Selection of lot size is a tradeoff between efficient sampling in the case of lot acceptance and the amount of re-screening in case of lot rejection. For example, if a lot size of 500 lanes (10 grids) was chosen and the lot was rejected during inspection, then those 10 grids would be re-screened (Geophysically re-surveyed) after a thorough root cause analysis . If, on the other hand, the lot passed, then those 10 grids would be cleared for turnover to government QA.

**Table 3-1
Code Letters (CL) for Entry into the Sampling Tables**

Lot Size	Verification Levels						
	VII	VI	V	IV	III	II	I
2-170	A	A	A	A	A	A	A
171-288	A	A	A	A	A	A	B
289-544	A	A	A	A	A	B	C
545-960	A	A	A	A	B	C	D
961-1,632	A	A	A	B	C	D	E
1,633-3,072	A	A	B	C	D	E	E
3,073-5,440	A	B	C	D	E	E	E
5,441-9,216	B	C	D	E	E	E	E
9,217-17,408	C	D	E	E	E	E	E
17,409-30,720	D	E	E	E	E	E	E
30,721 and larger	E	E	E	E	E	E	E

Table 3-2
Attributes Sampling Plans

CL	Verification Level (VL)								
	T	VII	VI	V	IV	III	II	I	R
	Sample Size (n)								
A	3072	1280	512	192	80	32	12	5	3
B	4096	1536	640	256	96	40	16	6	3
C	5120	2048	768	320	128	48	20	8	3
D	6144	2560	1024	384	160	64	24	10	4
E	8192	3072	1280	512	192	80	32	12	5
Notes:									
1/ When the lot size is less than or equal to the sample size, 100 percent attributes inspection is required.									
2/ One verification level (VL) to the left/right of the specified normal VL is the respective tightened/reduced plan. Tightened inspection of VL-VII is T, reduced inspection of VL-I is R.									

3.2.2.3 In accordance with the above discussion, the Sampling Plan that was selected was Verification Level (III), Code Letter (A) with switching procedures. The following sections present some basic information behind the Sampling Plan selection, implementation, and evaluation under the MIL STD. For further detail, refer to the MIL STD or other technical publications such as a Quality Engineer's Handbook.

3.2.2.4 Under this plan 32 random lanes were generated for the selected lot. These in turn were geophysically surveyed. TtEC utilized an internally developed program to randomly select the lanes to be sampled. The program utilizes the surveyed coordinates for the area to be sampled and outputs the coordinates for the start and end points of the randomly selected lanes. The lanes were marked by the QC survey team using the RTS or CLPS to mark the end of the lanes. The lanes were marked with pin flags, which were left in place in case they needed to reacquire an anomaly on that lane. The QC geophysical survey team collected the data using the EM-61 in conjunction with the CLPS or RTS positioning systems. The data was interpreted by a qualified geophysicist and returned to project database manager. If anomalies were selected as "dig" anomalies by the geophysicist, then the item was reacquired and dug as part of the QC process.

3.3 GEOPHYSICAL QC

3.3.1 To conduct the Acceptance Inspection, the selected proportion of lanes within each lot was geophysically re-surveyed to acquire new geophysical data. The anomaly locations identified from the new data are reacquired and excavated using the same equipment and procedures as the initial work. The results from each lot are compared with the following criterion:

Accept Criterion: That no ferrous items are found within the project defined size-depth parameters in each lot or grid.

Reject Criterion: That one or more ferrous items are found within the project defined size-depth parameters in each lot or grid.

In the case of acceptance, the lot is turned over to USAESCH for government QA; in case of rejection, the lot is returned to the SUXOS from the UXOQC with the reason for rejection. A thorough root cause analysis would be conducted to identify the reason for failure and corrective action taken.

3.4 RESULTS OF QUALITY CONTROL

3.4.1 There were no QC failures during the performance of this task order.

3.5 USAESCH QUALITY ASSURANCE

3.5.1 The on-site USAESCH Safety Representative performed QA of each grid. This consisted of surveying a portion of (i.e., approximately 10%) each grid with a hand held geophysical instrument. These hand held instruments received an equipment functional test prior to use each day. The standard USAESCH Quality Assurance Check is 10 percent of each grid or 10 percent check of the overall project.

3.5.2 In addition to the on site Safety Specialist QA checks the government blind seeded inert MEC items throughout the area. TtEC recovered all 44 inert MEC seed items emplaced by the USAESCH prior to the removal process, this was all the seed items that were placed by the USAESCH. All of the seed items are listed within the intrusive results located in Appendix C-1.

3.5.3 Completed and signed USAESCH Form 948's certifying QA acceptance of each grid is provided in Appendix B-3. The government QA report is also provided in Appendix B-3.

4.0 DOCUMENTATION

4.1 MAPS

4.1.1 Figure 4.1 shows the location of the area in relation to the former Ft. McClellan while Figure 4.2 depicts the location of the MEC item that was located, the location of all MD, and the location of the government seed items.

4.2 GEOPHYSICAL MAPPING COLLECTION SHEETS

4.2.1 Before each geophysical survey session the geophysical team leader fills out a survey sheet that has information required by the geophysicist to process and interpret the data. These sheets are located in Appendix D-1.

4.3 GRID MAPS

4.3.1 To facilitate the reacquisition process, color-coded anomaly maps were prepared for each grid. These maps were prepared using Oasis Montaj software and provide locations for each anomaly. The maps are included in Appendix D-2.

4.4 SITE QC DOCUMENTATION

4.4.1 Site QC documentation is included in Appendix B-2.

4.5 SITE SAFETY DOCUMENTATION

4.5.1 Site safety records are included in Appendix B-4.

4.6 DAILY SITE ACTIVITY REPORTS

4.6.1 Daily site activity reports are included in Appendix B-1.

4.7 PHOTOGRAPHS

4.7.1 Selective site photographs are included in Appendix B-5, while all the site photographs are included on the attached CD in a folder named "Photos".

4.8 FINANCIAL BREAKDOWN

4.8.1 No financial records are provided. This task was Firm Fixed Price.

5.0 SUMMARY

5.0.1 An MEC removal action was performed on the Bains Gap Road Area within the MLNWR on the former Fort McClellan. The removal action was performed prior to the Calhoun County Road Departments improvement project on this road. The fieldwork began January 2006 and was completed in April 2006. The work was performed by TtEC and approved subcontractors in accordance with approved work plans. The action completed the removal action alternative of *Clearance to Depth* as required by the PWS. The area that has been cleared under this project can be viewed on Figure 4.1 or 4.2.

5.0.2 Intrusive investigation of anomalies resulted in the excavation of one MEC item, 44 seed items, 4665 lbs of MD, and 4375 lbs of Non-MD. A complete breakdown of items discovered is located in Appendix C.

5.0.3 The area within the Bains Gap Road Area cleared under this task order, has been cleared to depth. It is impossible to guarantee complete and total removal of all MEC items. Therefore, some limited residual risk may still remain within the boundaries of this area.

6.0 REFERENCES

Tetra Tech EC, Inc., March 2004, Final Site Specific Removal Report, FWS Roads, Firebreaks, and High Use Areas

Tetra Tech EC, Inc., Dec 2004, Draft, Charlie Area Engineering Evaluation and Cost Analysis